

Customer No. 27405
Amdt. dated September 7, 2004
Application Serial No. 09/468,471
Reply to Office Action of May 5, 2004

PATENT
PA060-US

Listing of claims:

Claims 1-40 (canceled)

Claim 41 (previously presented): A method for forming a gas-enriched fluid comprising the acts of:

providing a mixing chamber having a first inlet, a second inlet, and an outlet;
delivering a first fluid to the mixing chamber via the first inlet, wherein the first fluid enters the mixing chamber and flows vortically within the mixing chamber; and
delivering a second fluid having a liquid phase supersaturated with a gas to the mixing chamber via the second inlet to mix with the first fluid and form the gas-enriched fluid.

Claim 42 (previously presented): The method, as set forth in claim 41, wherein the second fluid also has a gas phase.

Claim 43 (previously presented): The method, as set forth in claim 42, wherein the gas phase of the second fluid comprises oxygen.

Claim 44 (previously presented): The method, as set forth in claim 41, wherein the gas comprises oxygen.

Claim 45 (previously presented): The method, as set forth in claim 41, wherein the liquid phase of the second fluid comprises a physiologic solution isotonic to blood.

Claim 46 (previously presented): The method, as set forth in claim 41, wherein the liquid phase of the second fluid comprises physiologic saline.

Claim 47 (previously presented): The method, as set forth in claim 41, wherein the first fluid comprises blood.

Customer No. 27405
Amdt. dated September 7, 2004
Application Serial No. 09/468,471
Reply to Office Action of May 5, 2004

PATENT
PA060-US

Claim 48 (previously presented): The method, as set forth in claim 41, wherein the gas dissolves in the gas-enriched fluid in greater concentration than in the first fluid.

Claim 49 (previously presented): The method, as set forth in claim 41, wherein gas-enriched fluid comprises hyperoxic blood.

Claim 50 (previously presented): The method, as set forth in claim 41, wherein the gas-enriched fluid comprises hyperbaric blood.

Claim 51 (canceled)

Claim 52 (previously presented): The method, as set forth in claim 41, wherein the second fluid enters the chamber in a generally upward direction.

Claim 53 (previously presented): The method, as set forth in claim 41, wherein the first fluid enters the chamber in a first direction and the second fluid enters the chamber in a second direction, the first direction being substantially perpendicular to the second direction.

Claim 54 (previously presented): The method, as set forth in claim 41, wherein the first fluid enters the chamber in a first direction and the second fluid enters the chamber in a second direction, the first direction being substantially opposite the second direction.

Claim 55 (previously presented): The method, as set forth in claim 41, wherein the mixing chamber is pressurizable.

Claims 56 (withdrawn) A method for mixing blood and a fluid including a dissolved gas comprising the acts of:

providing a mixer having a pressurizable internal mixing chamber having a first inlet, a second inlet, and an outlet, the first inlet being arranged to create a vortical flow within the mixing chamber;

Customer No. 27405
Amdt. dated September 7, 2004
Application Serial No. 09/468,471
Reply to Office Action of May 5, 2004

PATENT
PA060-US

providing a pump adapted to deliver blood to the mixing chamber of the mixer via the first inlet; and

providing gas-supersaturated fluid supply assembly adapted to deliver a gas-supersaturated fluid to the mixing chamber of the mixer via the second inlet, the blood and gas-supersaturated fluid mixing with one another to form a mixed fluid.

Claim 57 (withdrawn) The method, as set forth in claim 56, wherein the gas-supersaturated fluid comprises a physiologic solution isotonic to blood.

Claim 58 (withdrawn) The method, as set forth in claim 56, wherein the gas-supersaturated fluid comprises physiologic saline.

Claim 59 (withdrawn) The method, as set forth in claim 56, wherein the gas comprises oxygen.

Claim 60 (withdrawn) The method, as set forth in claim 56, wherein the mixing chamber comprises a substantially cylindrical wall and wherein the first inlet is arranged to direct fluid along a path substantially tangential to the cylindrical wall.

Claim 61 (withdrawn) The method, as set forth in claim 56, wherein the second inlet is arranged to direct the second fluid in a generally upward direction.

Claim 62 (withdrawn) The method, as set forth in claim 56, wherein the second inlet is arranged to direct the second fluid in a direction normal to the initial direction of travel of the first fluid entering the chamber.

Claim 63 (withdrawn) The method, as set forth in claim 56, wherein the second inlet is arranged to direct the second fluid in a direction opposite to the initial direction of travel of the first fluid entering the chamber.

Customer No. 27405
Amdt. dated September 7, 2004
Application Serial No. 09/468,471
Reply to Office Action of May 5, 2004

PATENT
PA060-US

Claim 64 (withdrawn) The method, as set forth in claim 56, wherein the gas-supersaturated fluid supply assembly comprises a capillary assembly.

Claim 65 (withdrawn) The method, as set forth in claim 64, wherein the capillary assembly comprises a single capillary.

Claim 66 (withdrawn) The method, as set forth in claim 64, wherein the capillary assembly comprises a plurality of capillaries.

Claim 67 (withdrawn) The method, as set forth in claim 56, comprising the acts of:
using the pump to provide flow to the mixing chamber;
accumulating a supply of blood in the mixing chamber concomitantly with the blood flow; and
forming in the mixing chamber a gas head promoting dampening of pulsatility of the blood flow.

Claim 68 (previously presented): A blood oxygenation method comprising the act of: extracorporeally mixing blood flowing vertically within a mixing chamber and an oxygen-supersaturated fluid to effect direct liquid-to-liquid oxygenation forming oxygen-enriched blood.

Claim 69 (previously presented): The method, as set forth in claim 68, wherein the mixing chamber is a pressurizable chamber.

Claim 70 (previously presented): The method, as set forth in claim 68, wherein the oxygen-enriched blood has a pO₂ greater than about 500 mm Hg.

Claim 71 (previously presented): The method, as set forth in claim 68, wherein the oxygen-enriched blood has a pO₂ greater than about 760 mm Hg.

Customer No. 27405
Amdt. dated September 7, 2004
Application Serial No. 09/468,471
Reply to Office Action of May 5, 2004

PATENT
PA060-US

Claim 72 (previously presented): The method, as set forth in claim 68, wherein the oxygen-enriched blood has a pO₂ greater than about 1000 mm Hg.

Claim 73 (previously presented): The method, as set forth in claim 68, wherein the mixing occurs within a chamber at a pressure greater than about 760 mm Hg.

Claim 74 (previously presented): The method, as set forth in claim 68, wherein the mixing occurs within a chamber at a pressure greater than about 1000 mm Hg.

Claim 75 (previously presented): The method, as set forth in claim 68, wherein the mixing comprises convective mixing.

Claim 76 (previously presented): The method, as set forth in claim 69, wherein the blood is provided continuously to the chamber.

Claim 77 (previously presented): The method, as set forth in claim 69, wherein the oxygen-supersaturated fluid is provided continuously to the chamber.

Claim 78 (previously presented): The method, as set forth in claim 69, wherein the oxygen-supersaturated fluid is provided intermittently to the chamber.